

Name: \_\_\_\_\_ score: \_\_\_\_\_ / 10

There are 10 points possible on this quiz. No aids (book, notes, etc.) are permitted. You may use a non-programmable calculator. **Show all work and supporting calculations for full credit. Explain how you get your answers.**

1. (4 pts. total – 1 pt. each) For the weighted voting system  $[11; 7, 5, 2, 2]$ ,

(a) Why is  $\{P_1, P_2, P_4\}$  a winning coalition?

(b) Is  $P_2$  a critical member of  $\{P_1, P_2, P_4\}$ ? Show how you decided.

(c) Are there any dictators for this voting system? If so, who? Explain your reasoning.

(d) Which players, if any, have veto power? Explain your reasoning.

2. (3 pts.) For the weighted voting system  $[14 : 9, 6, 6, 2]$  there are 7 winning coalitions, listed here, with critical players underlined.

$$\begin{array}{cccc} \{\underline{P_1}, \underline{P_2}\} & \{\underline{P_1}, P_2, P_3\} & \{\underline{P_1}, \underline{P_3}, P_4\} & \{P_1, P_2, P_3, P_4\} \\ \{\underline{P_1}, \underline{P_3}\} & \{\underline{P_1}, \underline{P_2}, P_4\} & \{\underline{P_2}, \underline{P_3}, \underline{P_4}\} & \end{array}$$

Using this information, compute the Banzhaf Power Index of each player. You may leave your answers as fractions.

$P_1$ :

$P_2$ :

$P_3$ :

$P_4$ :

3. (3 pts. total – 1 pt. each) A small business uses a weighted voting scheme  $[q : 4, 2, 2, 1]$  for its four owners, with weights in proportion to the amount each invested.

- (a) One player suggests the quota be  $2/3$  of the total weight. What is the total weight, and what would be the quota?

total weight =

quota =

- (b)  $P_4$  responds, “But that quota makes me a dummy!” Explain what this means. (You do not need to show that statement is correct, although it is.)

- (c) If instead the group sets the quota to be 5, so the weighted system is  $[5; 4, 2, 2, 1]$ , then  $P_4$  is not a dummy. Give a coalition that shows this, and explain why.